NEVADA DIVISION OF ENVIRONMENTAL PROTECTION

FACT SHEET

(Pursuant to NAC 445A.874)

Type of Project:	**Geothermal**
Permit Number:	**UNEV40019**
Facility Name:	**Desert Peak Geothermal Plants 1 and 2**
Facility Address:	**Churchill County, Nevada**
Permittee:	**ORNI 3, LLC & Western States Geothermal Company**
Permittee Address:	**980 Greg Street** **Sparks, Nevada 89431-6039**
Property Owner:	**Private and Public Land Ownership, see Application**
Legal Description:	**Sections 21, 22, and 28, Township 22N, Range 27E, MDB&M in Churchill County, Nevada**
Number of Injection Wells:	**Two**
Permit Action:	**Third Renewal with modification**
Other Discharges	**Surface discharge to an infiltration basin, Section 28, T22N, R27E, MDB&M; and** **Surface discharge to a concrete evaporation basin, NE¼ Section 21, T22N, R27E, MDB&M**

A. Description of Discharge

Location: The Desert Peak Geothermal Plants 1 and 2 are located approximately 50 miles east-northeast of Reno within the Desert Peak Federal Geothermal Unit, Churchill County, Nevada. Desert Peak 1 was originally permitted in 1988 and currently has two injection wells, 21-2 and 22-22, located in the NE¼ of Section 21 and the NW¼ of Section 22, T22N, R27E respectively. Desert Peak 1 was permitted to both inject to two wells and discharge to an infiltration basin and a concrete-lined evaporation basin. This permit represents the third renewal of UNEV40019, and adds Desert Peak Geothermal Plant 2. No additional injection wells or discharge points are permitted in the renewal, as both plants will discharge to existing wells and basins.

Characteristics: Produced geothermal fluid is passed through Desert Peak Plant 1 and 2, both of which are dual flash geothermal power plants that separate the fluid into steam and brine phases. The steam generated by this process progresses to the cooling tower where it is condensed. The condensate is subsequently discharged to the surface via an infiltration basin. The resultant brine fluid is disposed of through subsurface injection activities into wells 21-2 and 22-22.

The produced geothermal fluid is poor in quality. It has several constituents that naturally exceed Drinking Water Standards (see Table 1). After the steam is condensed, most constituents are in concentrations below drinking water standards, with the exception of nitrate as nitrogen. The high nitrate concentrations result from ammonia in the gaseous phase in the production water that undergoes nitrification in the cooling tower, consequently producing higher levels of nitrate than that measured in the produced and injected fluid. The plant has been discharging water to the surface at approximately 2 to 3 million gallons per month which contains approximately 15 ppm nitrate as nitrogen since originally permitted in 1986. A shallow aquifer exists, but is discontinuous due to fracturing. The aquifer varies from approximately 300 to 700 feet below ground surface, depending on location. The shallow aquifer was not detected directly under the surface discharge area. The construction of a shallow aquifer monitoring well was not requested due to the level of nitrate as nitrogen discharged versus the depth to the shallow aquifer, the quality of the shallow aquifer, and the discontinuity of the surrounding lithology.

Occasionally, surface discharge may occur for short durations from geothermal fluids pumped directly from the production wells during maintenance and/or emergency purposes. NDEP will be

notified when this occurs.

The injected geothermal fluid has water quality characteristics similar to the receiving water. The concentrations in the injectate are slightly higher than those in the produced fluid due to loss of volume to steam generation (see Table 1).

A small volume of condensate is released from the second stage rotary separator turbine to a concrete evaporation basin. The water quality of this discharge is similar to the surface discharge, with all constituents meeting Drinking Water Standards with the exception of nitrate as nitrogen, which is approximately 15 ppm.

Table 1: Relative concentrations of produced, injected and surface discharge compared to MCLs

Parameter	Drinking Water Standard (MCL*, mg/L)	Produced Water (mg/L)	Injectate (mg/L)	Surface Discharge from Cooling Tower (mg/L)
TDS	1,000	8,900	10,000	180
Sodium	N/A	2,800	3,200	48
Chloride	400	4,900	5,600	3.8
Fluoride	4	4.7	5	<0.1
Arsenic	0.010	0.15	0.17	<0.002
Boron	N/A	20	22	0.29
Nitrate as N	10	<0.05	<0.05	11

* Maximum Contaminant Level

The high boron concentration in the injectate renders this fluid toxic to most plants. The water from the cooling tower which discharges to the surface, however, has boron concentrations significantly lower than the produced fluid.

B. Synopsis

February 2006: UIC Permit renewal with modification to add Desert Peak 2
June 2003: Temporary Permit authorizing injection into well 22-22
March 2003: Temporary Permit authorizing injection into well 23-1
August 2001: Modification of the permit
November 1999: Second renewal of permit
March 1992: First renewal of permit
September 1986: Original permit issued authorizing injection into well 21-2 and two surface discharges

The geothermal reservoir is located 3,000 to 10,000 feet below ground surface (bgs) in faults and fractures of pre-Tertiary rocks. The reservoir is capped by a sequence of Tertiary age volcanic rocks, but upward migration of geothermal fluids occurs through faults, forming non-continuous shallow thermal aquifers approximately 300 to 700 feet bgs. Chemistry data for the shallow aquifers indicate a quality similar to the geothermal reservoir. The gradient of the shallow aquifer is westward towards the Eagle Marsh playa, located about five miles from the discharge area. Hydrogeologic and water chemistry data indicate that the Eagle Marsh playa is the discharge area for the shallow aquifer.

Fluid injection will occur into injection wells 21-2 and 22-22 at a daily rate of no more than 3,000 kph or 6,560 gpm. Well 21-2 is cased and cemented to a depth of 2,030 feet. The principal injection zone for well 21-2 occurs between 2,375 to 3,192 feet. Well 22-22 is cased and cemented to a depth

of 2,506 feet. The principal injection zone for well 22-22 occurs between 2,506 and 6,730 feet. Disposal by injection will account for the majority of all disposed fluid.

Surface discharges to the infiltration basins will not exceed 200 gpm or 8 million gallons/month. The average surface discharge is approximately 3 million gallons per month. The surface discharge includes the cooling tower water as well as any emergency discharge from the producing wells. Emergency discharges directly from the producing wells occur only during well-stimulations (well start-up) and/or well maintenance procedures.

Analyses of waters from the injection zone for both wells are similar to those of the production wells and indicate that injection is occurring within the same geothermal reservoir. There are no public drinking water supply wells within the area of review.

C. Receiving Water Characteristics

Injection Zone:
The injection zone is located within the upper part of the geothermal reservoir and has water chemistry similar to the injectate. TDS in the injection zone is approximately 8,900 mg/l.

Shallow Aquifer:
The shallow aquifer appears to exhibit water chemistry of lesser quality than the cooling tower effluent, with the exception of nitrate as nitrogen.

D. Procedures for Public Comment

The Notice of the Division's intent to reissue a permit authorizing the facility to discharge to the ground water of the State of Nevada subject to the conditions contained within the permit is being sent to the Reno Gazette-Journal and the Lahontan Valley News for publication. The notice is being mailed to interested persons on our mailing list. Anyone wishing to comment on the proposed permit reissuance can do so in writing for a period of 30 days following the date of the public notice.

A public hearing on the proposed determination can be requested by the applicant, any affected state any affected interstate agency, the regional administrator of EPA or any interested agency, person or group of persons.

Any public hearing determined by the Administrator to be held must be conducted in the geographical area of the proposed discharge or any other area the Administrator determines to be appropriate. All public hearings will be conducted in accordance with NAC 445A.545.

The final determination of the Administrator may be appealed to the State Environmental Commission pursuant to NRS 445A.605.

E. Proposed Determination

The Division has made the tentative determination to reissue the proposed permit.

F. Proposed Effluent Limitations and Special Conditions

Table 1: Required Sampling

PARAMETER	LOCATION(S)	FREQUENCY	LIMITATIONS
Boron, mg/L	All monitoring locations described in I.C.1	Semi-annually, taken in April and October	Monitor and Report
Chloride, mg/L	All monitoring locations described in I.C.1	Semi-annually, taken in April and October	Monitor and Report
Electrical Conductivity, µmhos/cm	All monitoring locations described in I.C.1	Semi-annually, taken in April and October	Monitor and Report
Fluoride, mg/L	All monitoring locations described in I.C.1	Semi-annually, taken in April and October	Monitor and Report
Lithium, mg/L	All monitoring locations described in I.C.1	Semi-annually, taken in April and October	Monitor and Report
Nitrate as N and Total Nitrogen, mg/L	Spreader pipe discharge	Semi-annually, taken in April and October	Monitor and Report
pH, standard units	All monitoring locations described in I.C.1	Semi-annually, taken in April and October	Monitor and Report
Total Dissolved Solids, mg/L	All monitoring locations described in I.C.1	Semi-annually, taken in April and October	Monitor and Report
Total Solids, mg/L	All monitoring locations described in I.C.1	Semi-annually, taken in April and October	Monitor and Report
Antimony, mg/L	All monitoring locations described in I.C.1	Annually, taken in October	Monitor and Report
Arsenic, mg/L	All monitoring locations described in I.C.1	Annually, taken in October	Monitor and Report
Barium, mg/L	All monitoring locations described in I.C.1	Annually, taken in October	Monitor and Report
Beryllium, mg/L	All monitoring locations described in I.C.1	Annually, taken in October	Monitor and Report
Bicarbonate, mg/L	All monitoring locations described in I.C.1	Annually, taken in October	Monitor and Report
Calcium, mg/L	All monitoring locations described in I.C.1	Annually, taken in October	Monitor and Report
Carbonate, mg/L	All monitoring locations described in I.C.1	Annually, taken in October	Monitor and Report
Iron, mg/L	All monitoring locations described in I.C.1	Annually, taken in October	Monitor and Report
Lead, mg/L	All monitoring locations described in I.C.1	Annually, taken in October	Monitor and Report
Magnesium	All monitoring locations described in I.C.1	Annually, taken in October	Monitor and Report
Manganese, mg/L	All monitoring locations described in I.C.1	Annually, taken in October	Monitor and Report
Mercury, mg/L	All monitoring locations described in I.C.1	Annually, taken in October	Monitor and Report
Nickel, mg/L	All monitoring locations described in I.C.1	Annually, taken in October	Monitor and Report
Nitrate as Nitrogen and Total Nitrogen, mg/L	All injection and production wellheads	Annually, taken in October	Monitor and Report
Potassium, mg/L	All monitoring locations described in I.C.1	Annually, taken in October	Monitor and Report
Silica, mg/L	All monitoring locations described in I.C.1	Annually, taken in October	Monitor and Report
Sodium, mg/L	All monitoring locations described in I.C.1	Annually, taken in October	Monitor and Report

Table 2 continued: PARAMETER	**LOCATION(S)**	**FREQUENCY**	**LIMITATIONS**
Sulfate, mg/L	All monitoring locations described in I.C.1	Annually, taken in October	Monitor and Report
Total Phosphate, mg/L	All monitoring locations described in I.C.1	Annually, taken in October	Monitor and Report
Thallium, mg/L	All monitoring locations described in I.C.1	Annually, taken in October	Monitor and Report

Table 2: Required Quarterly Monitoring

PARAMETER	**FREQUENCY AND LOCATION**
a. Chemical analyses	As described in Part I.C.2.
b. Production volume, gallons/month and the mean, lowest and highest production rate, gpm	Continuous recording gauge(s) at the power plant site.
c. Injection volume, gal/month and the mean, lowest and highest injection rate, gpm	Continuous recording gauge located at injection wellhead or at plant.
d. Mean, lowest and highest injection pressure, psig	Continuous recording gauge located at injection wellhead.
e. Injection temperature, degrees Fahrenheit	Continuous recording gauge located at injection wellhead.
f. Surface discharge volume to infiltration basins, gallons/month, highest discharge rate, gpm	Totalizing flow meter on the discharge line feeding the surface spreader pipe or recording gauge located at production well
g. Average surface discharge temperature, degrees Fahrenheit	Continuous recording gauge located at spreader pipe and/or production wells

G. Rationale for Permit Requirements

This permit will help to ensure that the fluid discharged to both the injection well and surface discharge area does not adversely affect the existing hydrologic regime.

Prepared by: Birgit Widegren

Date: March 16, 2006